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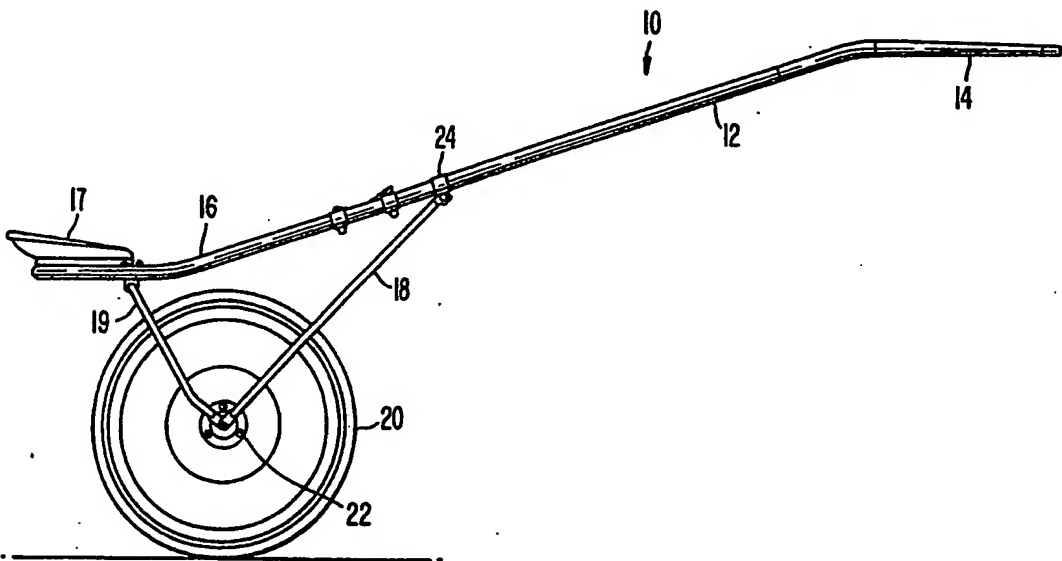
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b> <b>B62C 1/08, 5/02</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 93/19970</b> <b>(43) International Publication Date:</b> 14 October 1993 (14.10.93)
<b>(21) International Application Number:</b> PCT/AU92/00149 <b>(22) International Filing Date:</b> 7 April 1992 (07.04.92) <b>(71)(72) Applicant and Inventor:</b> WALSH, James, Stephen [AU/AU]; 122 Gow Street, Padstow, NSW 2211 (AU). <b>(74) Agent:</b> COYNE, Patrick, J.; Collier, Shannon & Scott, Level 3, 16-18 O'Connell Street, Sydney, NSW 2000 (AU). <b>(81) Designated States:</b> AU, CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE).		<b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> BALANCE ADJUSTMENT MECHANISM FOR USE WITH A RACING SULKY  <b>(57) Abstract</b> A horse-drawn racing sulky (10) having a fastener mechanism (24) for adjusting the balance of shafts (12) of the sulky (10) relative to the horse to adjust the weight transmitted through the shafts (12) from the horse to the sulky (10). The fastener mechanism (24) allows for connecting the wheel struts (18) of the sulky (10) adjustably along the length of the sulky shafts (12), forward movement increasing the weight transferred from the horse to the sulky (10) and rearward movement decreasing the weight transference.		

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**BALANCE ADJUSTMENT MECHANISM FOR USE WITH A RACING SULKY**

The present invention relates to a balance adjustment mechanism for use in varying the amount of weight transmitted from the horse to the sulky.

**BACKGROUND OF THE INVENTION**

In sulky racing, it has been determined that a horse's racing performance may be improved by adjusting the amount of weight transmitted from the horse to the sulky via the shafts of the sulky attached to the horse. Specifically, in this regard, the more weight transmitted from the horse via the shafts to the sulky results in increasing the angle to a preferred 90° angle between the vertical axis of the horse's hoof and the track surface when negotiating a bend during racing. This decreases the likelihood of injury to the horse during racing. If too little weight is transmitted from the horse via the shafts, however, during turning the horse will tend to lean further into the turn, which causes pain to the horse and decreases the speed of the horse. Generally, as the weight transmitted from the horse via the shafts to the sulky is increased, this reduces the net effort required of the horse to move himself and the sulky. It has been determined that arbitrarily the performance of a horse will vary depending upon the amount of weight transmitted from the horse to the sulky and the specific weight for optimum performance can only be determined through trial for a particular horse.

**OBJECTS OF THE INVENTION**

It is accordingly a primary object of the present invention to provide a balance adjustment mechanism that may be used to readily vary the amount of weight transmitted from the horse via the shafts to the sulky.

Additional objects and advantages of the invention are set forth, in part, in the description which follows and, in part, will be obvious from the description or may be learned by practice of the invention. The objects and advantages of the invention will be realized in detail by means of the instrumentalities and combinations particularly pointed out in the appended claims.

### SUMMARY OF THE INVENTION

A conventional horse-drawn sulky includes a pair of transversely separated wheels attached to and depending from a tubular frame and a pair of tubular shafts attached to and extending forwardly from opposite sides of the frame. The pair of tubular shafts are adapted for attachment to a horse generally centrally therebetween. A pair of front struts are associated with each wheel and are connected at one end thereof to an axle of each wheel on opposite sides of the wheel and at the other end to one of the shafts. A driver's seat is attached to the frame rearwardly and centrally of the shafts. Means are provided for selectively attaching the pair of wheels to the frame and pair of shafts, at a relatively more forward position to increase the weight transmitted from the horse to the shafts, and at a relatively more rearward position to decrease the weight transmitted to the shafts from the horse.

In accordance with the invention, the means for selectively attaching the pair of wheels to the frame and pair of shafts includes an annular collar slidably engaging each shaft. Means are provided for connecting another end of the front strut to the collar, and means are provided for releasably clamping the collar to the shaft at a selected position.

In addition, the releasably clamping means may include a pair of opposed tabs fastened to the collar with each tab having an axially aligned opening therein. A bolt extends through the axially aligned openings and a nut adapted for threaded engagement on the bolt is provided.

The shaft may have a plurality of opposed pairs of axially aligned openings along the length thereof with the collar having a pair of opposed axially aligned openings adapted to selectively register with any of the pair of openings of the shaft. A pin adapted to extend through registered pairs of openings of the shaft and collar is provided to maintain the collar at a selected position along the shaft.

The releasable clamping means may include a second annular collar with both the collars being fixedly clamped to the shaft. In addition, the means for connecting another end of the front strut may include an elongated rail extending along the shaft between, and connected at opposite ends thereof to, the collars.

A plurality of openings may be provided along the length of the rail with another end of the front strut being releasably fastened to a selected one of the openings of the rail.

The selectively attaching means may include an elongated rail attached to and extending along the shaft and having a plurality of openings along the length thereof with the another end of the front strut being releasably fastened to a selected one of these openings.

Another end of the front strut may be selectively fastened to a selected one of the openings of the rail by a pin adapted for selective axial engagement and disengagement relative to the front strut and a selected one of the openings.

The another end of the front strut may have inserted therein a connector fitting.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only, and are not restrictive of the invention as claimed. The accompanying drawings, which are incorporated herein by reference, and constitute a part of the specification, illustrate certain embodiments of the invention, and together with the detailed description, serve to explain the principles of the present invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a side elevation of a sulky with which one embodiment of the balance adjustment mechanism of the invention employed therewith;

Fig. 1A is a plan view of the sulky of Fig. 1;

Fig. 2 is a detailed view of the embodiment of the balance adjusting mechanism shown in Fig. 1;

Fig. 3 is a detailed view of an additional embodiment of the invention;

Fig. 3A is an additional detailed view of the embodiment of Fig. 3;

Fig. 4 is a detailed view of a third embodiment of the invention;

Fig. 4A is an additional detailed view of the embodiment of Fig. 4;

Fig. 5 is a detailed view of a fourth embodiment of the invention; and

Fig. 5A is an additional detailed view of the embodiment of Fig. 5.

### **DESCRIPTION OF THE PREFERRED EMBODIMENT**

With reference to the drawings, and for the present to Fig. 1 thereof, there is shown a sulky 10 having an embodiment of the invention associated therewith. The sulky is otherwise of conventional construction. The sulky has a pair of shafts 12 extending forwardly one on either side of the sulky. The shafts are of tubular construction. At a forward end of each shaft is a portion thereof generally known as a point, which is designated as 14. The opposite ends of each shaft 12 are connected to a generally U-shaped tubular structure 16 commonly termed a "back bend" or "back bow". A driver's seat 17 is provided at the back bend.

10 Front struts 18 and rear struts 19 are connected to wheels 20 on opposite sides thereof at a wheel hub 22. The front struts 18 are connected to the shaft 12 by a fastener designated generally as 24 and shown in detail in Fig. 2. The fastener 24 provides for balance adjustment in accordance with the invention.

As shown in Fig. 2, the fastener 24 has an annular band 26 extending around the shaft 12 in gripping relationship thereto. The annular band 26 has a pair of opposed tabs 28 and 30 fastened thereto. An opening 32 is provided in tab 28 and an opening 34 is provided in tab 30. A bolt 36 extends through openings 32 and 34 and a nut 38 is provided in threaded engagement with the bolt 36. The bolt 36 also passes through an opening (not shown) in the front wheel stays 18 extending from opposite sides of a wheel of the sulky. Upon tightening of the nut 38 relative to the bolt 36, the end of the struts 18 are connected to the shaft 12 and the collar 26 is clamped securely onto the shaft 12. With this structure, the connection of the end of the wheel struts 18 may be varied along the length of the shafts 12. If it is desired to decrease the weight transmitted from the horse to the sulky via the shafts, the connection is made relatively rearwardly along the shafts 12, and conversely if the weight transmitted from the horse to the sulky via the shafts is to be increased, then fastening is achieved at a position more forwardly along the shafts 12. This is facilitated by merely loosening the nut 38 so that the collar 26 is free to slide along the shaft 12 to the selected position at which the nut is tightened to achieve clamping of the collar 26 onto the shaft and fastening of the ends of the struts 18 to the shaft at the clamped location of the collar.

Another embodiment of the balancing adjustment mechanism in accordance with the invention is shown in Figs. 3 and 3A where a clamping arrangement therefor is designated generally as 40. The clamping mechanism 40 includes a collar 42 and associated tabs 44 and 46, bolt 48 and associated nut 50, which structure is identical to that shown and described with respect to Fig. 2. The collar 42 has, however, a pair of axially opposed openings 52 therein which are adapted to register with pairs of opposed openings 54 positioned along the length of the shaft 12. In achieving adjustment, the collar is slid along the shaft 12 to bring the openings 52 thereof into register with a selected pair of openings 54 of the shaft 12 at a desired position along the shaft for attachment of the struts 18 to the shaft 12 to achieve a predetermined balance adjustment. In this position, a pin 56 having a ring grip 58 is inserted through the pairs of holes 52 and 54, as shown in Fig. 3A. The nut 50 is then tightened as described with reference to the embodiment of Fig. 2 to achieve connection of the struts 18 to the shafts 12.

With the structure of the embodiment of Fig. 3, the connection to each of the shafts 12 may be ensured at a precise relative location by the use of openings 54 which are provided at identical locations along both of the shafts 12. Hence, connection of the wheel struts 18 on both sides of the sulky are at the same position along the shafts. This is achieved without requiring measurement for determining the location for attachment of the struts to the shafts.

In the embodiment of Fig. 4, the attachment mechanism for balance adjustment is designated generally as 60. The mechanism 60 includes a pair of collars 62 and 64 which are connected to the shaft 12 by rivets 66 and 68, respectively. A rail 70 is connected at opposite ends thereof to the collars 62 and 64 and extends along the shaft 12 between these collars. Connection of the rail 70 to the collars is effected by bolt 72 passing through an opening (not shown) in a tab 78 associated with like collar 64, as shown in Fig. 4. The bolts 72 and 76 are secured by tightening of a nut onto each bolt, with the nut associated with bolt 76 being designated as 77 in Fig. 4A, and a like nut (not shown) being associated with bolt 72.



The rail 70 has a plurality of openings 80 therein. The wheel strut 18 is connected to the rail 70 at one of the openings 80 by bolt 82 passing through an opening (not shown) in the rail 70 and an opening (not shown) in the end of the wheel stay 18, with this structure being secured by tightening of a nut 84 onto the bolt 82 to achieve the assembly as shown in Fig. 4.

With this arrangement, the location of attachment of the wheel struts to the shafts may be varied in accordance with the selection of one of the openings 80 along the length of the rail 70. As with the embodiment of Fig. 3, the mechanism 60 is identically positioned on both shafts 12 so that by using a matching opening for connection of the struts 18 at both shafts 12, connection of the struts to both shafts on opposite sides of the sulky will be at an identical relative position along the length of each of the shafts 12.

In the embodiment shown in Fig. 5, the mechanism for connection and balance adjustment is designated generally as 86. The mechanism 86 includes a rail 88 having a plurality of openings 90 along the length thereof. The rail 88 is connected to the shaft 12 by welding designated as 92. Connection of the struts to the shafts is made by the use of a pin 94 that extends through a selected opening 90 of the rail 88 and an opening 96 provided in a bifurcated connector 98 from which a threaded stud 100 extends. The stud 100 passes through openings (not shown) in identical end fittings 102 each of which is inserted into the end of a strut 18 extending from opposite sides of a wheel of the sulky. The fittings 102 have cylindrical portions 104 that are of slightly smaller diameter than the interior diameter of the tubular struts 18 to facilitate a sliding fit therein. A nut 106 is provided in threaded engagement with the stud 100 to secure the end fittings 102 to the bifurcated mounting 98.

As with the embodiments of Figs. 3 and 4, the openings in the rail 88 facilitate attachment of the struts 18 at desired locations along the shafts 12. By attaching the struts 18 on both sides of the sulky to the identical openings in the rail associated with the shafts on each side of the sulky, uniform connection of the struts to the shafts 12 on both sides of the sulky is ensured. The pin 94 provides for quick release and adjustment to any of the selected openings along the rail 88.

It will be apparent to those skilled in the art that various modifications and variations can be made in the construction and configuration of the present invention without departing from the scope or spirit of the invention. For example, various changes may be made to the clamping or attachment means of the present invention  
5 so long as it can still securely yet releasably connect the strut to the shaft. Thus, it is intended that the present invention cover the modifications and variations of the invention provided they come within the scope of the appended claims and their equivalents.

**I CLAIM:**

1. In a horse-drawn sulky, including a pair of transversely separated wheels attached to and depending from a tubular frame and a pair of tubular shafts attached to and extending forwardly from opposite sides of said frame and wheels, said pair of  
5 tubular shafts being adapted for attachment to a horse generally centrally therebetween, a pair of front struts associated with each wheel and connected at one end thereof to an axle of each said wheel on opposite sides of each said wheel and at another end thereof to one of said shafts, a driver's seat attached to said frame rearwardly and centrally of said shafts and means for selectively attaching said pair of  
10 wheels to said frame and pair of shafts at a relatively more forward position to increase the weight transmitted from the horse to the shafts and at a relatively more rearward position to decrease the weight transmitted to the shafts from the horse; the improvement wherein said selectively attaching means includes an annular collar slidably engaging each said shaft, means for connecting said another end of said front  
15 strut to said collar and means for releasably clamping said collar to said shaft at a selected position.
2. The horse-drawn sulky of claim 1, wherein said releasably clamping means includes a pair of opposed tabs fastened to said collar with each tab having an axially  
20 aligned opening therein, a bolt extending through said axially aligned openings and a nut adapted for threaded engagement on said bolt.
3. The horse-drawn sulky of claim 1, wherein said shaft has a plurality of opposed pairs of axially aligned openings along the length thereof and said collar has  
25 a pair of opposed axially aligned openings adapted to selectively register with any said pair of said openings of said shaft and a pin adapted to extend through registered pairs of openings of said shaft and collar to maintain said collar at a selected position along said shaft.
- 30 4. The horse-drawn sulky of claim 3, wherein said releasable clamping means includes a pair of opposed tabs fastened to said collar with each tab having an axially

aligned opening therein, a bolt extending through said axially aligned openings and a nut adapted for threaded engagement on said bolt.

5. The horse-drawn sulky of claim 1, wherein said releasably clamping means  
5 includes a second annular collar with both said collars being fixedly clamped to said shaft and said means for connecting said another end of said front strut includes an elongated rail extending along said shaft between, and connected at opposite ends thereof to, said collars, and a plurality of openings along the length of said rail with said  
10 another end of said front strut being releasably fastened to a selected one of said openings of said rail.

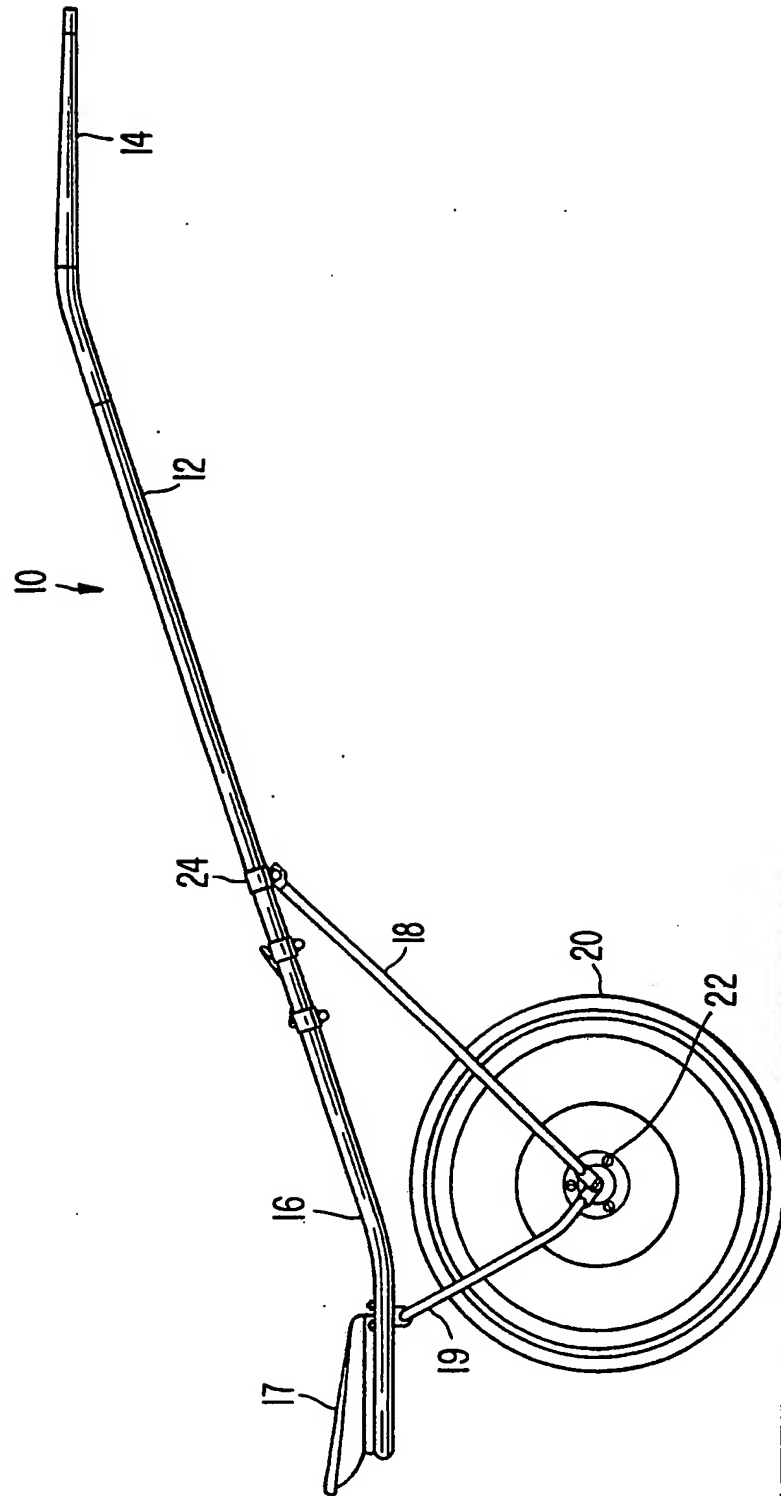
6. The horse-drawn sulky of claim 5, wherein said releasable clamping means  
includes a pair of opposed tabs fastened to each said collar with each tab having an axially aligned opening therein, a bolt extending through said axially aligned openings  
15 and a nut adapted for threaded engagement on said bolt.

7. In a horse-drawn sulky, including a pair of transversely separated wheels  
attached to and depending from a tubular frame and a pair of tubular shafts attached to and extending forwardly from opposite sides of said frame and wheels, said pair of  
20 tubular shafts being adapted for attachment to a horse generally centrally therebetween, a pair of front struts associated with each wheel and connected at one end thereof to an axle of each said wheel on opposite sides of each said wheel and at another end thereof to one of said shafts, a driver's seat attached to said frame rearwardly and centrally of said shafts and means for selectively attaching said pair of  
25 wheels to said frame and pair of shafts at a relatively more forward position to increase the weight transmitted from the horse to the shafts and at a relatively more rearward position to decrease the weight transmitted to the shafts from the horse; the improvement wherein said selectively attaching means includes an elongated rail attached to and extending along said shaft, and a plurality of openings along the length  
30 of said rail with said another end of said front strut being releasably fastened to a selected one of said openings of said rail.

8. The horse-drawn sulky of claim 5, wherein said another end of said front strut is selectively fastened to a selected one of said openings of said rail by a pin adapted for selective axial engagement and disengagement relative to said front strut and said selected one of said openings.
- 5
9. The horse-drawn sulky of claim 8, wherein said another end of said front strut has inserted therein a connector fitting.
10. The horse-drawn sulky of claim 6, wherein said another end of said front strut is selectively fastened to a selected one of said openings of said rail by a pin adapted for selective axial engagement and disengagement relative to said front strut and said selected one of said openings.
- 10
11. The horse-drawn sulky of claim 10, wherein said another end of said front strut has inserted therein a connector fitting.
- 15
12. The horse-drawn sulky of claim 7, wherein said another end of said front strut is selectively fastened to a selected one of said openings of said rail by a pin adapted for selective axial engagement and disengagement relative to said front strut and said selected one of said openings.
- 20
13. The horse-drawn sulky of claim 12, wherein said another end of said front strut has inserted therein a connector fitting.

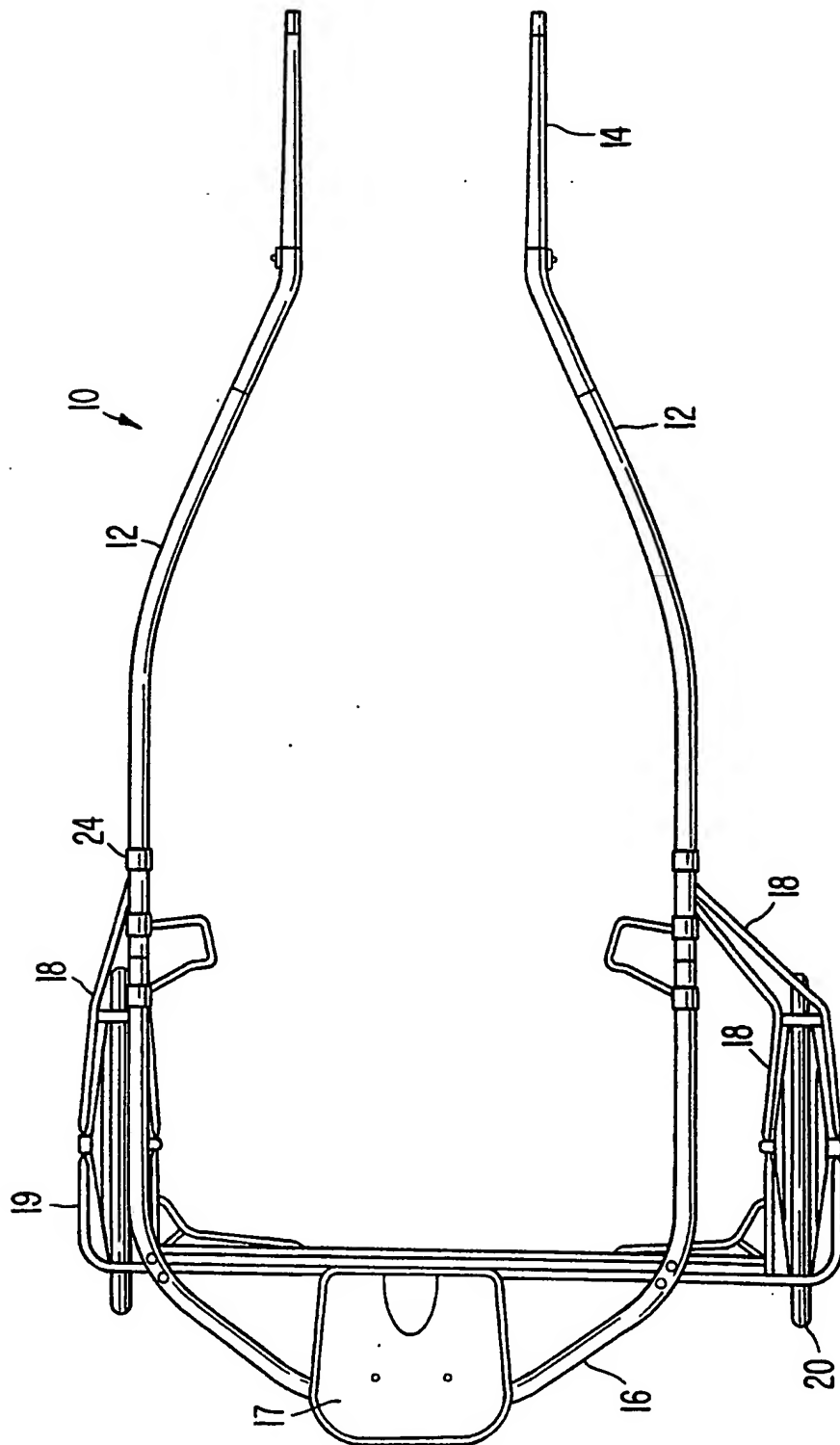
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FIG. 1



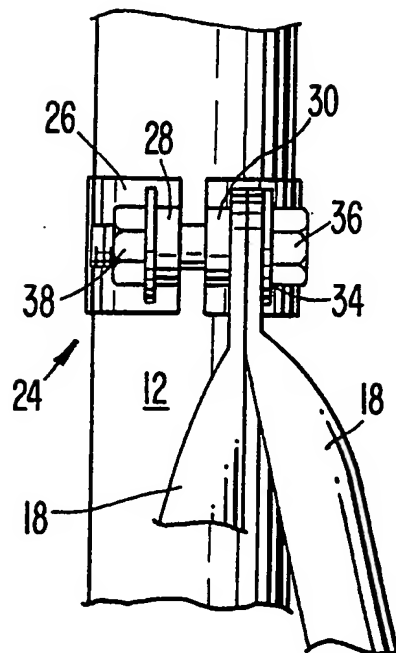
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**FIG. 1A**

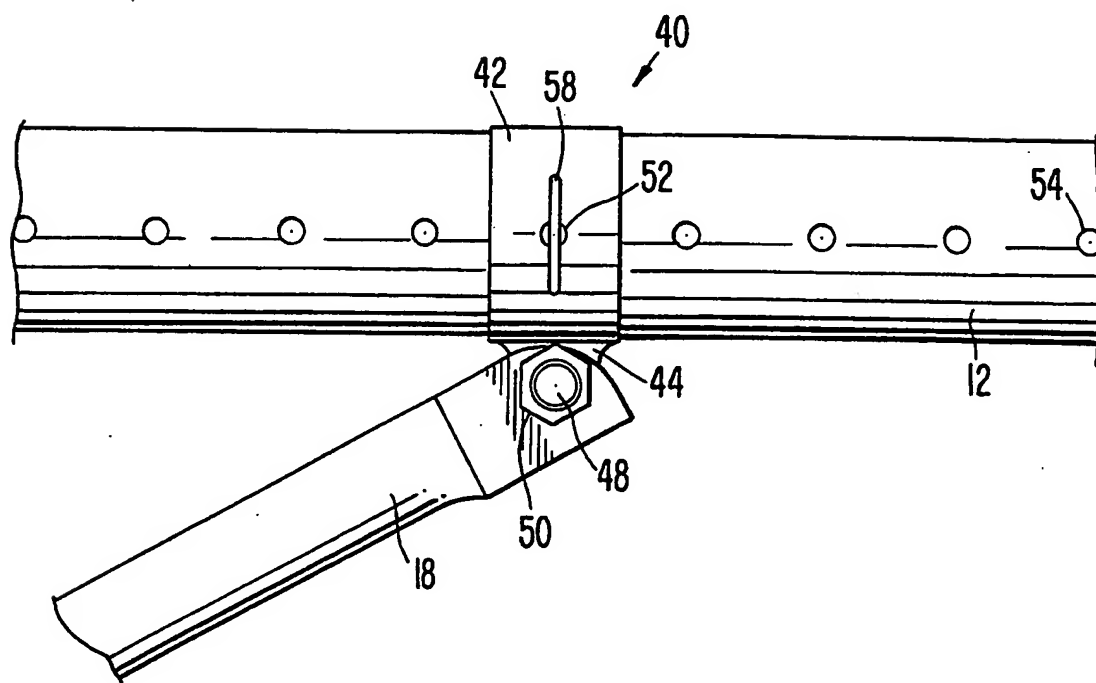


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**FIG. 2**



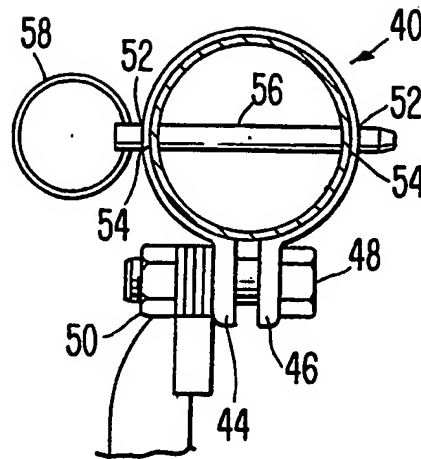
**FIG. 3**



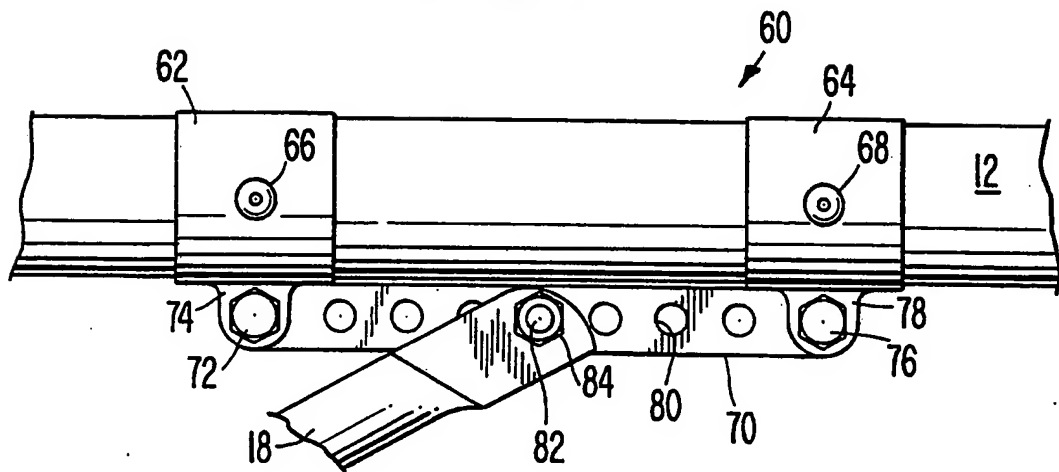


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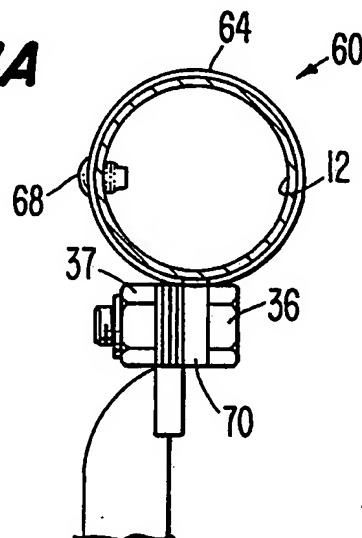
**FIG. 3A**



**FIG. 4**

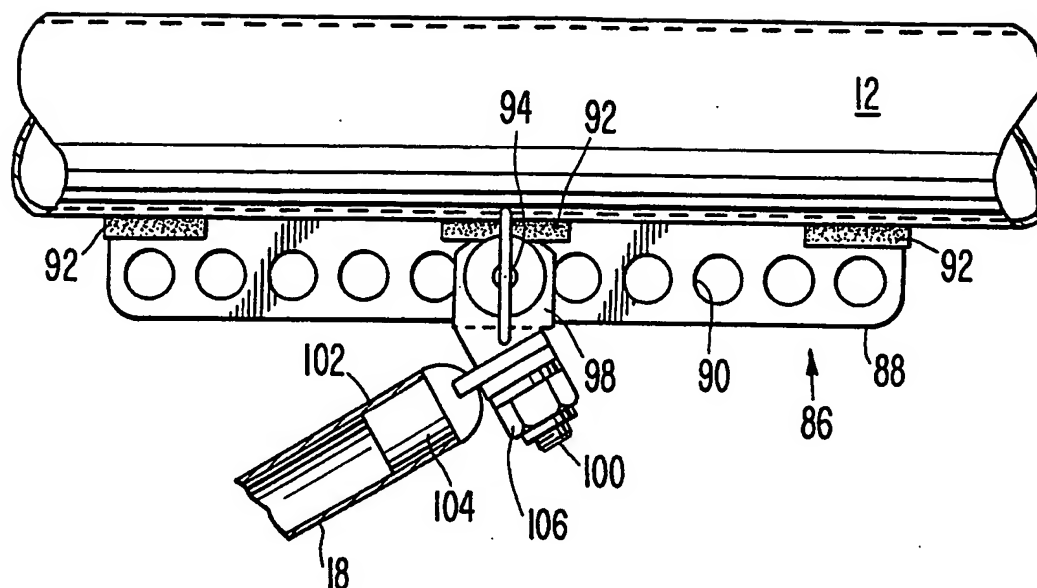


**FIG. 4A**

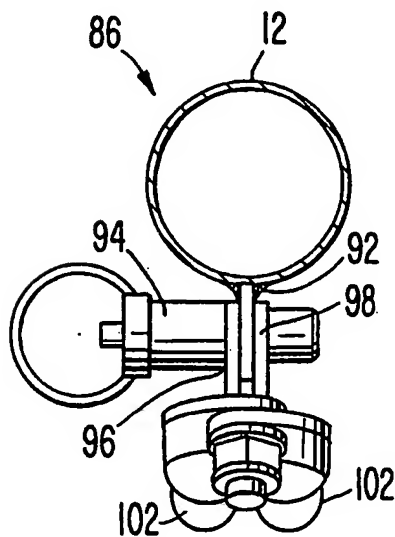


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**FIG. 5**



**FIG. 5A**



## INTERNATIONAL SEARCH REPORT

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>				
According to International Patent classification (IPC) or to both National Classification and IPC Int. Cl. <sup>8</sup> B62C 1/08, 5/02				
<b>II. FIELDS SEARCHED</b>				
Minimum Documentation Searched <sup>7</sup>				
Classification System	Classification Symbols			
IPC	B62C 1/08, 5/02			
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched <sup>8</sup>				
AU : IPC as above				
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>				
Category <sup>9</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate of the relevant passages <sup>12</sup>	Relevant to Claim No <sup>13</sup>		
X, Y	US,A,4078829 (DAVIS) 14 March 1978 (14.03.78). See column 3, lines 21-67; column 5, lines 6-13 and lines 38-42 and Figures 1, 3 and 5.	(1-6, 8-11)		
X, Y	US,A,4095815 (MITCHELL) 20 June 1978 (20.06.78). See column 2, lines 58-68; column 3, lines 3-6 and Figures 2, 7 and 8.	(7, 12-13)		
X	US,A,3482851 (PICKARD) 9 December 1969 (09.12.69). See column 2, lines 62-64; column 3, lines 42-44 and Figure 2.	(7, 12-13)		
(continued)				
<p>* Special categories of cited documents : <sup>10</sup></p> <table border="0"> <tr> <td style="vertical-align: top;"> <p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="vertical-align: top;"> <p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </td> </tr> </table>			<p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>
<p>"A" Document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>			
<b>IV. CERTIFICATION</b>				
Date of the Actual Completion of the International Search 19 June 1992 (19.06.92)		Date of Mailing of this International Search Report 1 July 1992 (01.07.92)		
International Searching Authority  <b>AUSTRALIAN PATENT OFFICE</b>		Signature of Authorized Officer  C.M. WYATT		

**FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET**

X, Y	AU,A,60748/80 (CONTINENTAL ENGINEERING LTD.) 28 January 1982 (28.01.82). See page 6, lines 3-8; page 7, lines 17-21 and Figure 1.	(7, 12-13)
A	US,A,4313611 (HEINZE, Jr. et al) 2 February 1982 (02.02.82).	
A	US,A,3503624 (WEBER et al) 31 March 1970 (31.03.70).	

**V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim numbers ..., because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim numbers ..., because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim numbers ..., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4a

**VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

**Remark on Protest**

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT ON  
INTERNATIONAL APPLICATION NO. PCT/AU 92/00149**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member
US	4095815	CA 1038416

END OF ANNEX